BARANSKIY, A.D.; KOMKOVA, Ye.A.

On the presence of thioether sulfur in coals of the Irkutsk Basin. Izv. Fiz.-khim. nauch.-issl. inst. Irk. un. 4 no.2: 263-266 '59. (MIRA 16:8)

(Irkutsk Basin--Coal--Analysis)
(Sulfur organic compounds)

BARANSKIY, A.D.; POLYAKOVA, V.A.; OLINTSEV, N.F.

Application of the method of coal separation into fractions for the study of Irkutsk coals rich in sulfur. Izv. Fiz.-khim. nauch.-issl. inst. Irk. un. 5 no.1:13-27 '61. (MIRA 16:8)

(Irkutsk Basin—Coal—Analysis)
(Sulfur compounds)

BARANSKIY, A.D.; ZININA, A.T.; TOROPOVA, T.A.

Sulfur in a primary tar of certain coals of the Irkutsk Basin. Izv. Fiz.-khim. nauch.-issl. inst. Irk. un. 5 no.1:36-42 '61. (MIRA 16:8)

(Irkutsk Basin--Coal--Carbonization)
(Sulfur--Analysis)

BARANSKIY, A.D.; NURMINSKIY, N.N.

Sulfur in the products of thermal dissolution of some coals of the Irkutsk Basin. Izv. Fiz.-khim. nauch.-issl. inst. Irk. un. 5 no.1:43-49 '61. (MIRA 16:8)

(Irkutsk Basin--Coal liquefaction)
(Sulfur--Analysis)

BARANSKIY, A. I.

BARANSKIY, A. I. -- "Children's Sporting Schools in the System of Physical Training of Youth (Experience in Operating Children's Sporting Schools in the USSR and Youth Sporting Schools in the Polish People's Republic)." State Central Order of Lenin Inst of Physical Culture imeni I. V. Stalin. Moscow, 1955. (Dissertation for the Degree of Candidate of Pedagogical Sciences.)

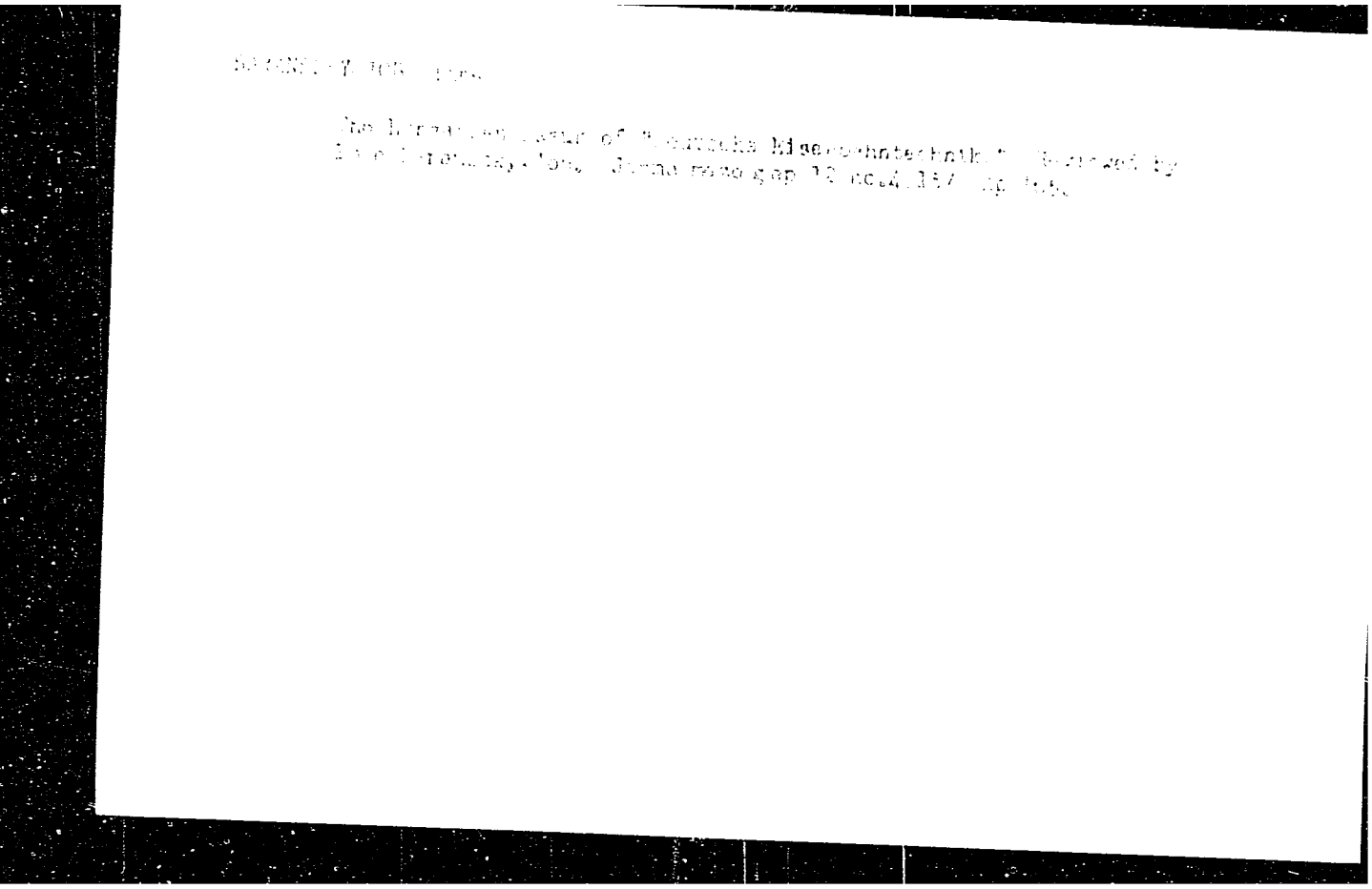
SO: Knizhnaya letopis', No. 4, Moscow, 1956

BARANSKIY. A. N. Cand Tech Sci -- "Increasing the efficiency of the use of wheel tractors on wet soils." Minsk, 1961 (Acad of Agr Sci BSSR. Belorussian Sci Res Inst of Agr). (KL, 4-61, 194)

TSYGANOV, R.Ya.; ULAZOVSKIY, V.A., red.; TOKIN, A.N., red.; KADIL'NIKOVA, A.F., red.; KURDYUKOV, G.V., red.; KOVRIN, Ye.I., red.; BARANSKIY, A.V., red.

[Introducing new equipment and the achievements of science into industry] Vnedrenie novoi tekhniki i dostizhenii nauki v proizvodstvo. Volgograd, 1963. 215 p. (MIRA 18:3)

1. Volgograd. Institut inzhenerov gorodskogo khozyaystva.



USSR / Optics

K

Abs Jour: Referat Zhur-Fizika, 1957, No 4, 10347

Author : Baranskiy, K.N., Gribov, L.A., Prikhok'ko, V.P.
Inst : Moscow State University USSR.
Title : Indices of Refraction of Rochelle Salt Near the Point of Phase Transition.

Orig Pub: Kristallografiya, 1956, 1, No 3, 368-369

Abstract: The indices of refraction of Rochelle salt were measured as functions of the temperature in the range from 18 to 35° near the upper Curie point. The measurements were carried out by the angle of least deflection method (prism of Rochelle salt) with the aid of a mercury spectrum, which was photographed at various temperatures, and the position of the lines was compared. The Rochelle salt crystal temperature was measured with the aid of a copper-constantan thermocouple with an accuracy ± 0.01° The measurement accuracy of the index of refraction was ± 10^{-5} Measurements were carried at two prisms

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USSR / Optics

Abs Jour: Referat Zhur-Fizika, 1957, No 4, 10347

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of different orientations. For each of the two directions, the change in the index of refraction was measured as the function of the temperature for the line λ = 5460 A. To fix the temperature of the phase transition, simultaneous measurement was made of a change in the capacity of a capacitor (with a Rochelle-salt dielectric) as a function of the temperature.

Within the temperature-measurement accuracy, the temperature dependence of the index of refraction at the point of the phase transition does not deviate from linearity.

Card : 2/2

BARANSKIY, K. N. Cand Phys-Math Sci -- (diss) "Excitation and ~~expansion~~ diffusion of hypersonic vibrations in quartz." Mos, 1957. 14 pp (Moscow Order of Lenin and Order of Labor Red Banner State Univ im M. V. Lomonosov. Physics Faculty), 100 copies (KL, 42-57,91)

AUTHOR: Baranskiy, K.N. 70-2-20/24

TITLE: The excitation of hypersonic oscillations in quartz. (Vozbuzhdeniye giperzvukovykh kolebaniy v kvartse)

PERIODICAL: "Kristallografiya" (Crystallography), 1957, Vol.2, No.2, pp. 299-302 (U.S.S.R.)

ABSTRACT: A technique has been elaborated for exciting vibrations in the range 100 Mc/s to 10 kMc/s in quartz. Optical diffraction effects were used for studying the oscillations. A metal-ceramic valve (ГИ-11Б or ЛА-11) with a power of about 6 W fed the quartz which was placed in a tuned cavity at the end of a co-axial line of characteristic impedance, 50 Ω. The generator frequency was measured with a resonance wavemeter. The e/m wavelength in quartz at 1 kMc/s is about 14 cm so that a quarter wave line can be made from the specimen. In a particular case the fundamental of longitudinal oscillations was 0.24 Mc/s so that the 6800th harmonic corresponded to 2 kMc/s. The sound wavelength was 3.5×10^{-4} cm (infra-red region) giving a diffraction angle for 5 780 A light of 9°28'. At 600 Mc/s Q of the system was 2 500. Even at 333 Mc/s the Hg lines at 5 460 and 5 780 A are well separated in the spectrum. The velocity of propagation in quartz at these frequencies is 5 750 m/sec ± 1%.

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The excitation of hypersonic oscillations in quartz. (Cont.) 70-2-20/24

Acknowledgments to I.A. Yakolev and G.P. Motulevich.
There are 2 figures, 1 plate, 3 references, 7 of which are Slavic.

ASSOCIATION: Moscow State University imeni M.V. Lomonosov (Moscow Gosudarstvennyy Universitet)

Card 2/2

SUBMITTED: November 30, 1956.

AVAILABLE: Library of Congress

AUTHOR YAKOVLEV, I.A., VELICHKINKA, T.S., SARAMSKIY, K.N. 56-4-42/52

TITLE The Absorption of Sound on the Occasion of a Phase Transformation (Poglosheniye zvuka pri fazovom prevrashchenii v segnetovoy soli. Russian)

PERIODICAL Zhurnal Eksperim i Teoret. Fiziki, 1957, Vol 32, Nr 4, pp 935 - 936 (U.S.S.R.)

ABSTRACT

Landau and Khalatnikov predicted an amplification of sound absorption in the phase corresponding to the low temperature in the proximity of the λ-point. For the purpose of confirming this phenomenon the authors carried out experiments on the absorption of sound in a seignette salt in the vicinity of its upper CURIE point. The authors applied the impulse method for the measuring of the damping of the sound in the monocrystal of the seignette salt. The impulses of the transversal oscillations were transferred to a foil of the seignette salt which was fitted in a thermostat.

A diagram shows the here found dependence of the amplitude coefficient α of the sound absorption upon temperature. The results obtained here show the following. - The anomalous absorption of sound in the case of a phase transformation of the second order, which was predicted by LANDAU and KHALATNIKOV actually takes place in a solid body. This phenomenon has its characteristic peculiarities in a seignette-electricum. - a transversal sound wave with a certain polarization suffers an anomalous

Card 1/2

56-4-42/52

The Absorption of Sound on the Occasion of a Phase Transformation

absorption and the absorption of the sound increases in both phases on the occasion of the approximation of the temperatures of the phases at the λ-points. The case investigated here was explained already in a theoretical work by LANDAU, the corresponding results will be explained in a detailed paper. On the basis of the results discussed in the present paper also an observation made by H.B. HUNTINGTON, Phys. Rev., Vol. 72, p 321 (1947) is explainable. (With 1 illustration).

ASSOCIATION Moscow State University
PRESENTED BY
SUBMITTED 7.1.1957
AVAILABLE Library of Congress

Card 2/2

BARANSKIY, K.N.

56-4-5

AUTHORS: Yakovlev, I.A., Velichkina, T.S., Baranskiy, K.N.

TITLE: The Influence Exerted by an Electrostatic Field on the Sound Absorption in Seignette Salts (Vliyaniye elektrostaticheskogo polya na pogloshcheniye zvuka v segnetovoy soli) (Letter to the Editor)

PERIODICAL: Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol. 33, Nr 4, pp. 1075 - 1076 (USSR)

ABSTRACT: The evaluation of the piezoelectric properties of a Rochelle salt crystal shows that a deformation that stems from the propagation of an accoustic wave brings about a polarization of the crystal along its Seignette-electric axis x. It is therefore important to invesitgate the absorption of these waves also then, when the crystal is already from the beginning pre-polarized by an external electrostatic field in the direction of the x-axis. This case was experimentally examined. It was shown that at temperatures above the Curie point the sound absorption does not depend on the external field. At temperatures several degrees lower than the Curie point the sound absorption is only slightly dependent on the external field. At temperatures lying only 0,1 to 0,2° C below the Curie point the influence of the electro-

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The Influence Exerted by an Electrostatic Field on the Sound Absorption in Seignette Salts

56-4-53/54

static field on the sound absorption is very great. There are 2 figures and 1 Slavic reference.

ASSOCIATION: Moscow State University (Moskovskiy gosudarstvennyy universitet)

SUBMITTED: July 27, 1957

AVAILABLE: Library of Congress

Card 2/2

20-114-3-18/60

AUTHOR: Baranskiy, K. N.

TITLE: The Excitation of Ultrasonic Oscillations in Quartz (Vozbuzhdeniye v kvartse kolebaniy giperzvukovykh chastot)

PERIODICAL: Doklady Akademii Nauk SSSR,1957,Vol.114,Nr 3,pp.517-519(USSR)

ABSTRACT: At first reference is made to papers dealing with the same subject and they are shortly discussed. According to the author the modern resonance methods of ultrashort-wave engineering must be employed for an increase in the frequency of ultrasound and a method for the production of high strengths of the high-frequency electric field in quartz must be worked out. The solution of this problem fundamental to the production of ultrasound might moreover liberate the experimental technology from the necessity of using thin quartz plates. Besides, what is still more important, the processes taking place in a massive quartz at ultrasonic frequencies might be optically investigated. As sources of the high-frequency field the author used generators of uninterrupted sine oscillations. These generators permit the continuous frequency change of the field from 1.10^8 to 2.10^9 cycles and could give

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The Excitation of Ultrasonic Oscillations in Quartz

an actual output of 5 to 10 Watt. The power of the generators selected here correspond to the high resonance-qualities of the systems into which the piezoelectric quartz was inserted. The assembly of the quartz plates is discussed. By the method discussed here sound vibrations in a thick frequency range up to 2.10^9 cycles can be excited in a thick quartz plate and in this connection the diffraction spectra of first order can be excited. By using thick quartz plates of the x-section any acoustic frequency could be obtained in the range of ultrasonic frequencies, which is very important for investigations of the frequency-dependence of the elastic properties of substances. The measurements made by the diffraction method of the velocity of longitudinal waves in quartz at $20^{\circ}C$ showed that this speed remains constant in the entire frequency range examined here and that it amounts to 5750 m/sec. The first employment of this method was the investigation of the peculiarities of the diffraction of light on high-frequency ultrasound. A selective reflection already takes place at frequencies of $1 - 2.10^8$ cycles and manifests itself in the asymmetry of the intensities of the spectra of +first and -first order. The phenomena occurring at higher frequencies

The Excitation of Ultrasonic Oscillations in Quartz 20-114 3-18/60

are also shortly discussed. There are 4 references, 2 of which are Slavic.

ASSOCIATION: Moscow State University imeni M. V. Lomonosov (Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova)

PRESENTED: January 12, 1957, by G. S. Landsberg, Member of the Academy (Deceased)
SUBMITTED: January 9, 1957

Card 3/3

BARANSKIY, K. N.

"Sound Absorption in Quartz Crystals."

Paper presented at the 4th All-Union Conference on Acoustics, Moscow, 26 May - 2 Jun 58.

24(1)

PHASE I BOOK EXPLOITATION SOV/1627

Vsesoyuznaya akusticheskaya konferentsiya. 4th, Moscow, 1958

Referaty dokladov (Abstracts of Reports at the Fourth All-Union Acoustical Conference) Pt. 2. Moscow, Akad. nauk SSSR, 1958. 44 p. Number of copies printed not given.

Sponsoring Agency: Akademiya nauk SSSR.

Resp. Ed.: L.M. Brekhovskikh, Corresponding Member, USSR Academy of Sciences.

PURPOSE: These abstracts are intended for scientists and engineers interested in acoustics.

COVERAGE: This is a mimeographed collection of brief abstracts of papers presented at the Fourth All-Union Acoustical Conference. The subjects covered are propagation of sound in nonhomogeneous media, nonlinear acoustics, ultrasonics, acoustic measurements, electroacoustics and architectural and structural acoustics.

TABLE OF CONTENTS:

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S/056/61/040/003/030/031
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24.7400

AUTHORS: Shustin, O. A., Velichkina, T. S., Baranskiy, K. N., Yakovlev, I. A.

TITLE: Absorption of sound by Rochelle salt in the neighborhood of its lower Curie point

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 40, no. 3, 1961, 979-980

TEXT: At a temperature in the neighborhood of its upper Curie point ($\theta = 24^{\circ}C$) Rochelle salt exhibits an anomalously large absorption of transverse elastic waves propagating along the z-crystallographic axis and polarized along the y-axis. This result is given in an earlier paper (Ref. 1: I. A. Yakovlev, T. S. Velichkina, K. N. Baranskiy, ZhETF, 32, 935, 1957). In the present paper, the absorption of waves polarized in the manner mentioned above and having a frequency $\nu = \omega/2\pi = 5$ Mc/sec is investigated for the case of Rochelle salt in the neighborhood of its lower Curie point ($\theta = -18^{\circ}C$). The figure shows the experimental absorption curve 1 - 1 (crystal temperature T as abscissa, absorption

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coefficient $\varkappa$ as ordinate). Its theory is by L. D. Landau who has derived the following formula:

$$\varkappa^2 = \frac{\omega^2\rho}{2}\left(\mu\left[1+\frac{8\pi\lambda^2(\mu/\varepsilon+2\pi\lambda^2)}{\mu^2(\varepsilon^{-2}+16\pi^2\omega^2\gamma^{-2})}\right]^{1/2}-\mu-\frac{4\pi\lambda^2/\varepsilon}{\varepsilon^{-2}+16\pi^2\omega^2\gamma^{-2}}\right). \qquad (1)$$

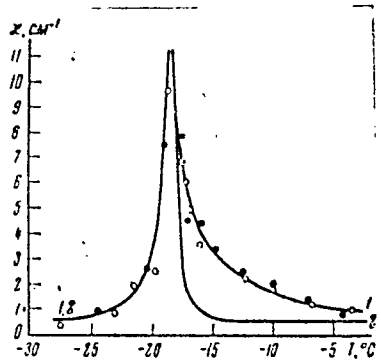
Here, the dielectric constant of the Rochelle salt is given by $\varepsilon = 4\pi C/(\theta-T)$ for $T<\theta$ and $\varepsilon = 2\pi C/(T-\theta)$ for $T>\theta$, ρ is the density of the salt, μ the modulus of shear at constant induction D_x, λ the piezoelectric constant of the crystal, and γ the coefficient in the kinetic equation $\partial D_x/\partial t = \gamma\partial\tilde{\Phi}/\partial D_x$ ($\tilde{\Phi}$ the thermodynamic potential of the crystal). Numerical values are substituted into formula (1), and the following approximate formula is obtained: $\varkappa = 8\sqrt{\frac{\rho}{\mu}}\frac{\pi^2\lambda^2\omega^2/\gamma}{\varepsilon^{-2}+16\pi^2\omega^2\gamma^{-2}}$. It is represented in the figure by the curve 2 - 2. The good agreement for $T<\theta$ between Landau's theory and the experiment allowed a determination of the relaxation time τ for $T<\theta$: $\tau = 4\pi\varepsilon/\gamma \sim 3.4\cdot10^{-8}/(\theta-T)$ sec. There are

Absorption of sound by...

1 figure and 3 Soviet-bloc references.

ASSOCIATION: Fizicheskiy institut Chekoslovatskoy Akademii nauk, Praga (Institute of Physics of the Czechoslovakian Academy of Sciences, Prague)

SUBMITTED: January 7, 1961



Card 3/3

39501
S/056/62/043/002/052/053
B108/B102

AUTHORS: Baranskiy, K. N., Shustin, O. A., Velichkina, T. S., Yakovlev, I. A.

TITLE: Frequency dependence of sound absorption in Rochelle salt near its upper Curie point

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 2(8), 1962, 730

TEXT: Continuing earlier work (ZhETF, 40, 979, 1961; 32, 935, 1957) the authors studied the frequency and temperature dependences of the absorption coefficient for transverse waves in Rochelle salt. Measurements on 5 and 15 Mcps gave the same maximum absorption coefficient K (Fig.). The results agree with Landau's approximate formula $K = A\omega^2/(\varepsilon_x^{-2} + B\omega^2)$. Here, A and B are functions of only the constants of the material. ε_x is the dielectric constant in the x-direction. There is 1 figure.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

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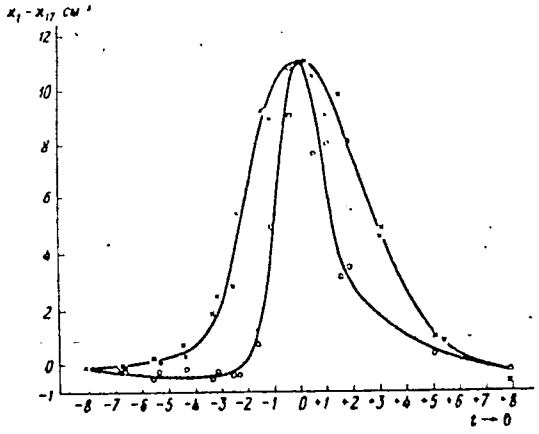
Frequency dependence of sound ...

SUBMITTED: June 2, 1962

Fig. Temperature dependence of the sound absorption coefficient K.
Legend: o - ω = 5 Mcps, x - ω = 15 Mcps.



Card 2/2

BARANSKIY, K.N.; KOZHATKIN, V.A.; VADKOVSKIY, V.N.

New demonstration simulators for an electricity course. Usp. fiz. nauk 84 no.4:730-731 D '64 (MIRA 18:1)

BARANSKIY, L.N., mladshiy nauchnyy sotrudnik; NAUMENKOV, N.L., mladshiy nauchnyy sotrudnik

Observation of earth currents at the stations Mirnyy and Oasis in 1957. Inform.biul.Sov.antark.eksp. no.14:24-28 '60. (MIRA 13:6)

1. Institut fiziki Zemli Akademii nauk SSSR.
(Mirnyy region, Antarctica--Terrestrial electricity)
(Oasis region, Antarctica--Terrestrial electricity)

26427
S/169/61/000/007/103/104
A006/A101

3.9410

AUTHORS: Baranskiy, L.N., Naumenkov, N.L.

TITLE: Observation of telluric currents at Mirnyy and Oasis stations in 1957

PERIODICAL: Referativnyy zhurnal. Geofizika, no. 7, 1961, 48, abstract 70336 ("Inform. byul. Sov. antarkt. ekspeditsii", 1960, no. 14, 24-28)

TEXT: A description is given of the equipment for observations of telluric currents according to the IGY program. Lead sheets were used as electrodes. On the continent the electrodes were placed on spots of outcropping rocks. The resistance of the line was about 10 km. At Mirnyy the telluric currents were visibly recorded by the [illegible]-09 (EPP-09) potentiometer. Micropulsations of H were registered by an induction coil with a ferrite core. Noises from the electrization of the Earth's surface by snowflakes during snowstorms are characteristic for telluric currents. In sea currents such noises do not exist. The field of telluric currents in the Antarctic region is a very intensive one: 5-10 v/km during disturbed days and up to 500 v/km during quiet days. The orientation of telluric currents at Mirnyy coincides with the direction of the coastal

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line. The amplitudes of current variations in the sea are 10^{-2} a/m^2. The sea currents decrease rapidly at a greater distance from the coast (by 6 - 7 times at 10 km distance).

G. Fonarev

[Abstracter's note: Complete translation]

BARANSKIY, L.N.

Induction receiver of magnetic variations. Izv. AN SSSR. Fiz. zem. no.1:127-130 '65. (MIRA 18:5)

1. Institut fiziki Zemli AN SSSR.

LORAN, Zh. [Laurent, G.]; PONSO, K.; POTEN'YE, M.; BARANSKIY, L.N.; KAZAK, B.N.; MATVEYEVA, E.T.

Some characteristics of magnetic Pc 1 pulsations in magnetically coupled regions (Borok-Kerguelen station, February, 1964). Geomag. i aer. 5 no.3:499-501 My-Je '65. (MIRA 18:5)

1. Sluzhba ionosfernykh issledovaniy, Parizh (for Loran, Ponso, Poten'ye). 2. Institut fiziki Zemli AN SSSR, Moskva (for Baranskiy, Kazak, Matveyeva).

BARANSKIY, N.N., red. [deceased]; NIKITIN N.P., prof., POKSHISHEVSKIY, V.V., prof., red.; SAUSHKIN, Yu.G., prof., red.; RODIONOVA, F.A., red.

[Economic geography in the U.S.S.R.; history and modern development] Ekonomicheskaia geografiia v SSSR; istoriia i sovremennoe razvitie. Moskva, Prosveshchenie, 1964. 662 p. (MIRA 18:12)

BARANSKIY, Nikolai Nikolaevich

1964

GEOGRAPHY

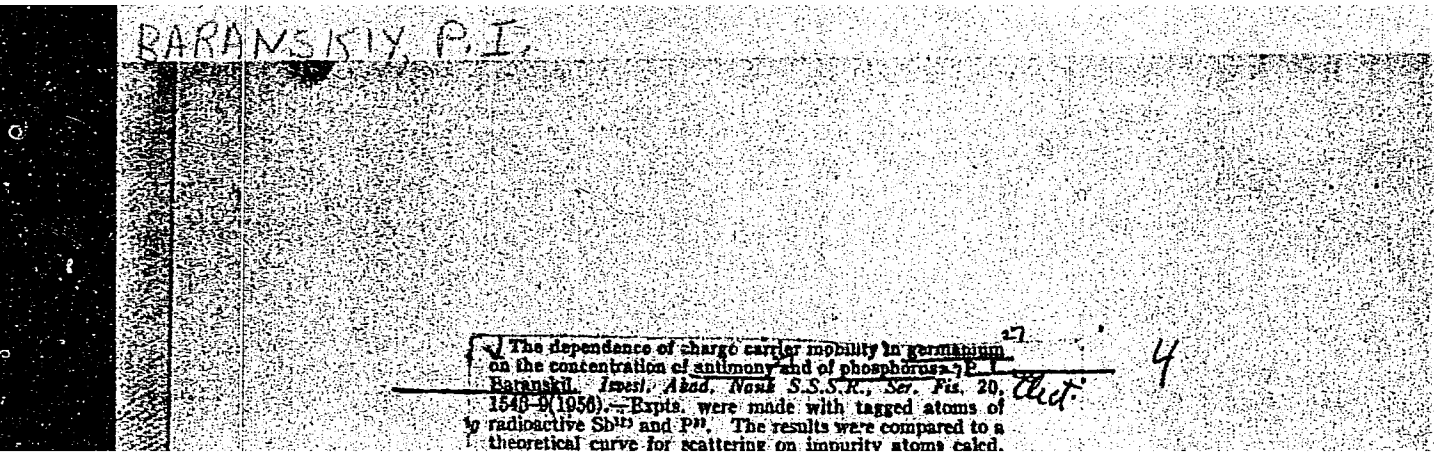
DECEASED

1881-1963

SHTENBEK, M.; BARANSKIY, P.I.

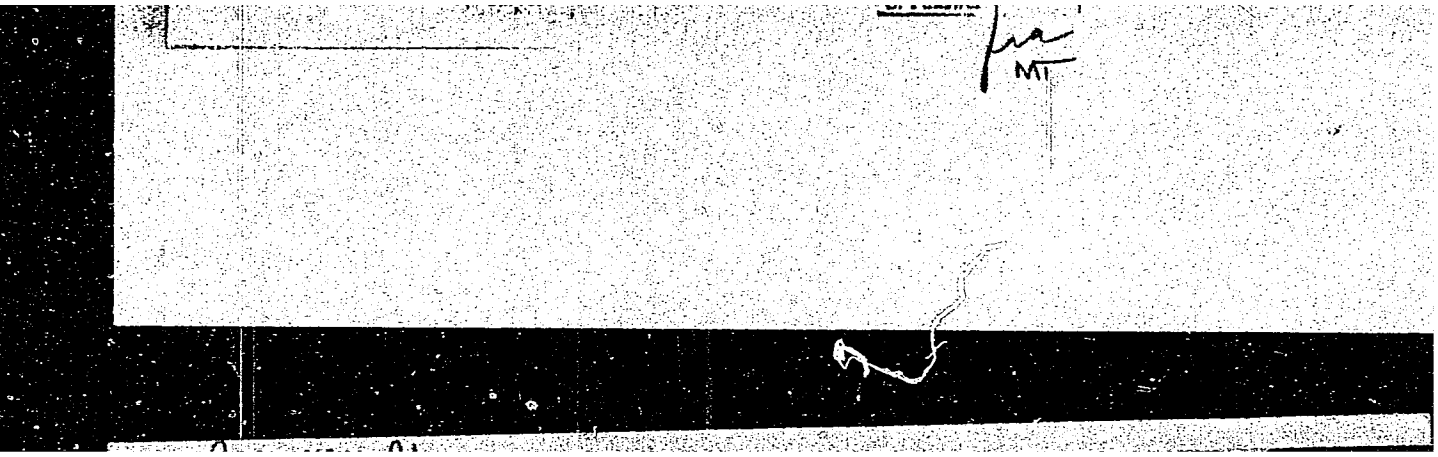
Investigating the Peltier effect and thermoelectromotive forces in germanium Izv. AN SSSR. Ser. fiz. 20 no.12:1491-1493 D '56.
(MLRA 10:3)

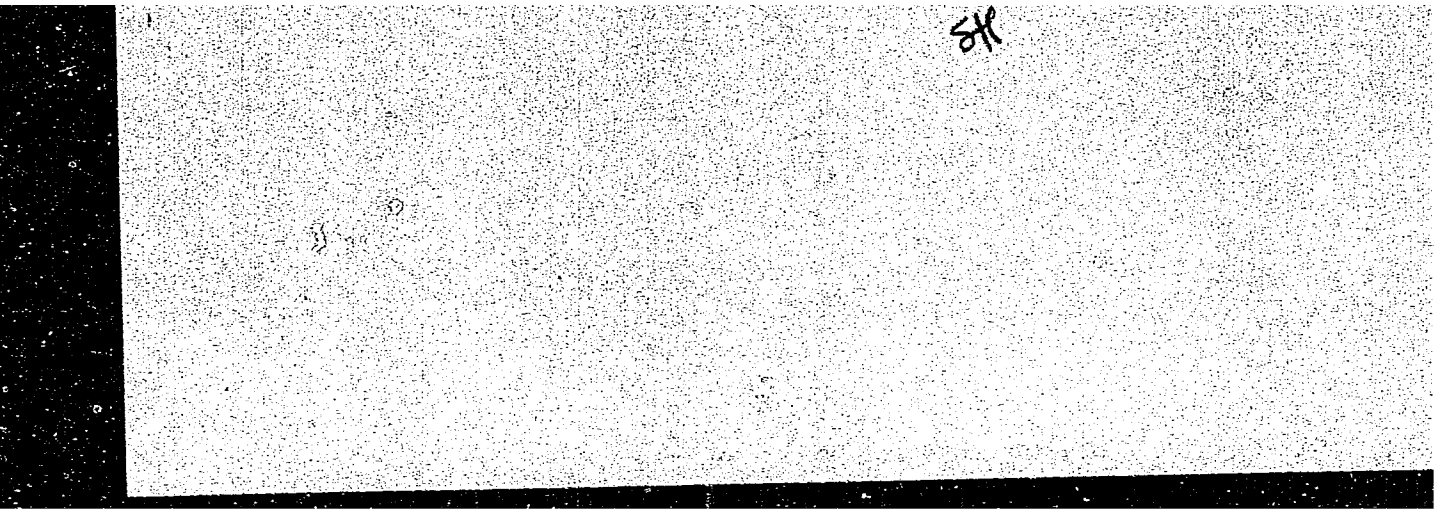
1. Institut fiziki Akademii nauk USSR.
(Germanium-Electric properties)



BARANSKIY, P.I.

The dependence of charge carrier mobility in germanium on the concentration of antimony and of phosphorus. P. I. Baranskii. *Izvest. Akad. Nauk S.S.S.R., Ser. Fiz.* 20, 1548–9(1958).—Expts. were made with tagged atoms of radioactive Sb^{122} and P^{32}. The results were compared to a theoretical curve for scattering on impurity atoms calcd.





BARANSKIY, P.I.

CARD 1 / 2 PA - 1206

SUBJECT USSR / PHYSICS
AUTHOR SCHTENBEK, M., BARANSKIJ, P.I.
TITLE The Methods employed for the Precise Measuring of the PELLETIER-Effect and of Thermoelectromotoric Forces.

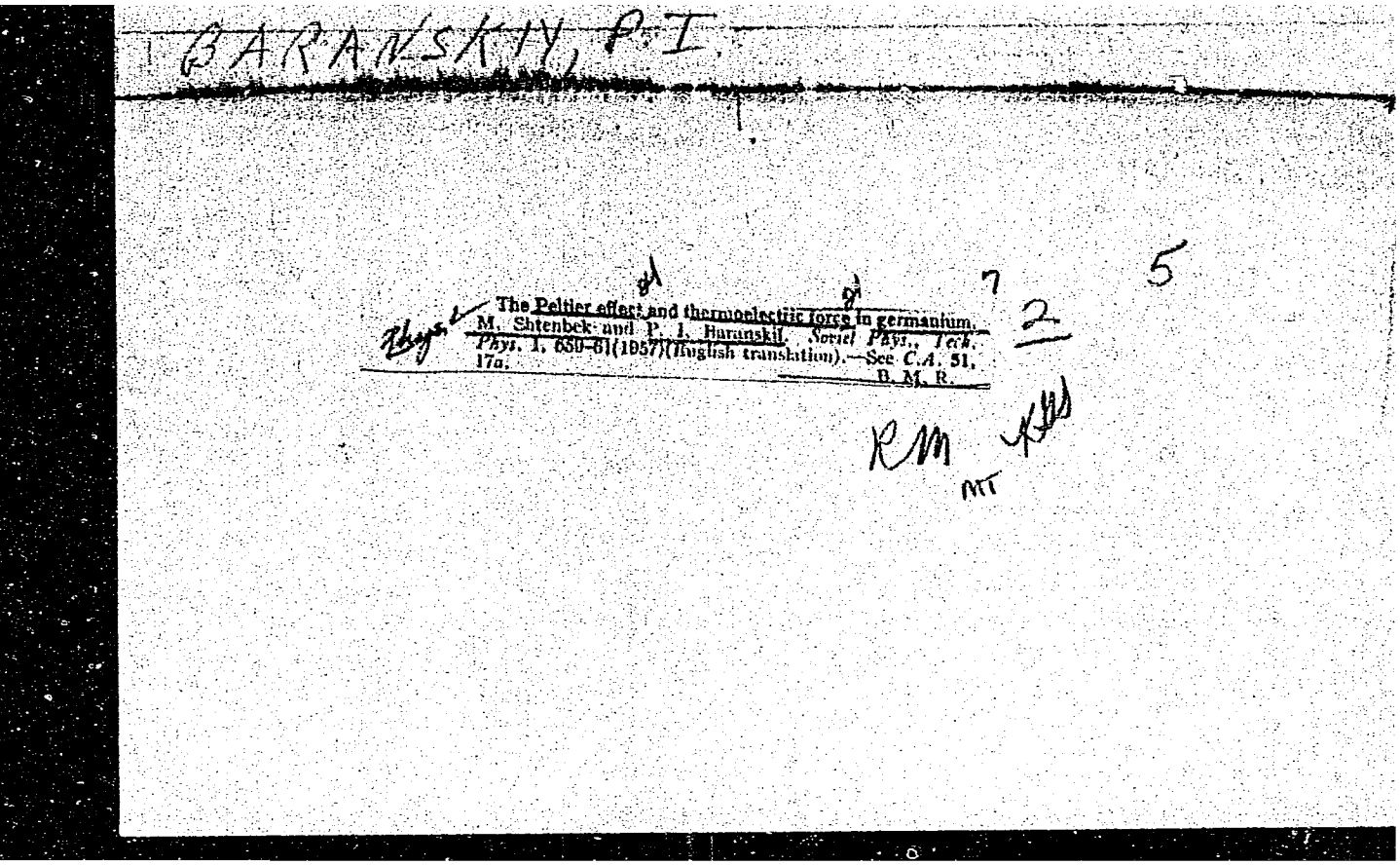
PERIODICAL Žurn. techn. fis. 26, 1373-1388 (1956)
Publ. 7 / 1956 reviewed 8 / 1956

The methods employed for measuring the PELLETIER voltage P and thermoelectromotoric force by means of which the formula $P = \alpha T$ was checked on a semiconductor are described. Tests did not confirm the formula $P = \alpha T$. The method worked out here is a further development of the Jordan method. As it is impossible to produce fully symmetrical heat resistances, a method was worked out which is indifferent in this respect. At first, the case of a homogeneous sample with a constant electric resistance which is independent of the current i is investigated. This is followed by a case in which the resistance depends on i. Finally, there follows the case of an inhomogeneous sample. Investigation was based on the method of intersecting curves: P was measured with a given T_o. At first, this was done for i = + 110 mA, and the readings on the galvanometer n_1' and n_2', which correspond to the two heating powers W_1' and W_2', were noted. The same happened in the case of i = - 110 mA. The graphical representation of $\Delta T(W_1)$ and $\Delta T(W_2)$ resulted in straight lines which intersected at a point S. Deviation from the straight line was not more than from 1 to 1,5% in

Z. angew. techn. fis, 26, 1373-1388 (1956) CARD 2 / 2 PA - 1206

the case of all tests carried out. The thermoelectric force was computed according to a formula. The average values of the differential thermoelectromotoric force and of the PELLETIER effect must stand in the usual thermodynamic relation to each other if the relation is correct also in differential form. If experiments show that this is not the case, the initial equations are wrong. The method for the exact study of the thermoelectromotoric force has been tested and is characterized by the immediate determination of ΔT. The apparatus used for the examination of P and α is described, and the basic errors of the method as well as those resulting from measuring are shown. The methods worked out for the exact measuring of P and α may serve as reliable criteria for theoretically drawn conclusions. This method shows that all basic thermoelectric relations are not satisfied with accuracy.

INSTITUTION:



BARANSKIY, P. I.

Phys The Peltier effect and thermoelectric forces in germanium. M. Shtenbek and P. I. Baranskii. *Soviet Phys., Tech. Phys.* 1, 650–61(1957)(English translation).—See *C.A.* 51, 17a. B. M. R.

2

5

RM KHS NTT

PA - 2116

AUTHOR SHTENBEK, M., PARANSKIY, P.I.

TITLE Investigation of the Minority Current Carriers Movement in Germanium (Izucheniye dvizheniya neosnovnykh nositeley toka v ob''yeme germaniya).

PERIODICAL Zhurnal Tekhn. Fiz., 1957, Vol 27, Nr 2, pp 221-232 (U.S.S.R.)

Received 3/1957 Reviewed 3/1957

ABSTRACT The purpose of the experiments and the experimental order are first discussed. The study of the motion of the injected holes which reach the collector permit the following measurement. a) the time of flight t_1 and the mobility μ, b) the diffusion in the longitudinal direction that is vertical to the electric field. From the attached diagrams the deviations of the electrometers are to be seen as a function of frequency. A table shows the measuring values for transitions through zero, the flying times, and mobilities. Experiments are typically characterized by the dependence of the deviation of the electrometer on the size of the magnetic transversal field. Summarizing the following conclusions are drawn. 1) a zero-method was worked out for the accurate measuring of mobility in the case of the exclusion of influence exercised by surfaces, 2) methods for the measuring of the coefficients of longitudinal- and transversal diffusion were worked out. 3)Quantitatively (with an accuracy of 1%) the independence of mobility of the voltage of the electric field (in the interval of $2 \leqslant E \leqslant 10$ V/cm) has been confirmed for the case of Ge of the type "n". 4)It was shown that mobility in the direction E and the coefficients of longitudinal diffusion obey the Einstein relation. 5) It was found that the coefficient of transversal diffusion is considerably greater

Card 1/2

Investigation of the Minority Current Carriers Movement in Germanium.

than that of longitudinal diffusion (Influence exercised by anisotropy?). 6) In the case of experiments in which the presence of slight holes to the amount of ≈ 0,5% of their total number might have been recorded, their presence could not be observed. (8 illustrations, 1 table)

ASSOCIATION Physical Institute of the Academy of Science of the Ukr. ~~U~~.S.S.R., Kiev.
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Card 2/2

PA - 2117

AUTHOR SHTENBEK, M., BARANSKIY, P.I.

TITLE Experimental Study of the Interrelations between the Pelletier Effect and the Thermoelectromotoric Forces in Germanium (Eksperimentaljnoe izucheniye vzaimosvyazi effekta Peljtje i termoelektrodvizhushchikh sil v germanii).

PERIODICAL Zhurnal Tekhn. Fiz., 1957, Vol 27, Nr 2, pp 233-237 (U.S.S.R.)

Received 3/1957 Reviewed 3/1957

ABSTRACT In the course of the work dealing with interaction between the Pelletier coefficient P and the coefficient of the differential thermoelectromotoric force α the authors succeeded in obtaining new results. In the first chapter the treatment of the previously obtained results in the case of a new graduation of thermocouples is dealt with. In order to avoid errors graduation of the thermocouples was carried out with the aid of a helium thermometer. The accuracy attained on the occasion with the determination of P and the results of temperature measurements permitted control of the equations mentioned in previous papers (Zhurn.Tekhn. Fiz., 1956, Vol 26, Nr 7, p 683). In the next chapter the new results are described. In diagrams the dependences of P and α on temperature are shown for the various samples. The inequation $P \neq \alpha T$, which was observed within the domain of admixture conductivity in the samples of germanium of the types "n" and "p" which are of different specific resistance, must be considered to be undisputed.
The values for P and α, which were obtained in the samples investigated

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Experimental Study of the Interrelations between the Pelletier Effect and the Thermoelectromotoric Forces in Germanium.

within the domain of their own conductivity, corresponded to the relation $P = \alpha T$. The results obtained for P permitted computation of the thermal capacity of the gas of the current carriers for samples of the types "n" and "p", and the values of this thermal capacity coincide with those of the thermal capacity of the classical perfect gas.
(6 illustrations)

ASSOCIATION Physical Institute of the Academy of Science of the Ukr U.S.S.R., Kiev
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Card 2/2

BARANSKIY, P. I.

57-6-2/36

AUTHOR BARANSKIY, P.I., and LASHKAREV, V.Ye.

TITLE Measurements of the Volume Thermo-e.m.f. in Germanium. (Izmereniye ob"yemnoy termoeds v germanii - Russian)

PERIODICAL Zhurnal Tekhn. Fiz., 1957, Vol 27, Nr 6, pp 1161-1166, (U.S.S.R.)

ABSTRACT The basic errors developing on the occasion of investigating thermo-e.m.f. of the n- and p-type in germanium by means of pressing contacts were analysed. The authers show that the character of the surface treatment influences little the measuring results of α(e.m.f.) if the temperature gradient is produced not by means of heating one of the thermo-search electrode pins but of one of the head electrodes. Here the thermo-search electrode pins which are furniched with thermo elements are used only for the measurement of the temperature at the point of contact between the pin and the sample as well as for the measurement of the thermo-voltage between them. The authors show that by means of correct etching of the sample coinciding results can be obtained if temperature gradients are used which were produced in the one or the other aforementioned manner. The authors also show that $\Delta T \leq 20^{\circ}C$ α is dependent on ΔT in the interval $0,5 \leq \Delta T \leq 20^{\circ}C$. (6 illustr., 7 Slavic references).

ASSOCIATION Institute for Physics of the Academy of Science of the USSR, Kiew.

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SUBMITTED 14.12.1956

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Card 1/1

SOV/58-59-12-27699

Translation from: Referativnyy zhurnal, Fizika, 1959, Nr 12, p 170 (USSR)

AUTHORS: Miselyuk, Ye.G., Baranskiy, P.I., Kosenko, V.Ye.

TITLE: On the Application of Radioactive Isotopes for the Study of the Condition and Distribution of Admixtures in Germanium

PERIODICAL: Tr. Sessii AS UkrSSR po mirn. ispol'zovaniyu atomn. energii. Kiyev, AS UkrSSR, 1958, pp 140 - 142

ABSTRACT: The distribution of Sb^{124}, P^{32}, Ag^{110}, Sn^{113}, Zn^{65} and Fe^{59} admixtures in Ge, their condition in a Ge volume, and their effect on the magnitude and the type of conductivity, were studied by means of the tagged atom method. The diffusion of the vaporous Sb^{124} and Zn^{65} in Ge was also studied at various temperatures. Empirical formulae are derived.

A.I. Mosharov

Card 1/1

AUTHORS: Baranskiy, P. I., Konoplyasova, N. S. SOV/57-58-8-1/37

TITLE: Investigation of the Volume-Gradient Thermo-e.m.f. and of the Heat Conductivity in Germanium Monocrystals With Definite Crystallographic Orientation (Izucheniye ob"yemno-gradiyentnoy termoeds i teploprovodnosti v monokristallakh germaniya izvestnoy kristallograficheskoy oriyentatsii)

PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1958, Nr 8, pp. 1621 - 1630 (USSR)

ABSTRACT: In this paper a method for the investigation of the volume-gradient thermo e.m.f. ℓ_{U_α} is exposed. This voltage is generated when a grad T is present in the sample because of the volume heterogeneities. This method was tested in experiments with germanium. The function of the ordinary thermo e.m.f. α_{Ge-Cu} versus T and the dependence of the volume-gradient thermo e.m.f.upon the temperature was investigated. The following was confirmed: 1) The transition to an intrinsic conductivity with varying temperature (which is observed, when the sign of the ordinary thermo e.m.f. α_{Ge-Cu} is inversed) is accompanied by a reduction of the volume-gradient thermo e.m.f.

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2) If temperatures are sufficiently high (and correspond to the conditions of intrinsic conduction) the volume-gradient thermo e.m.f. within experimental errors is independent of the crystallographical orientation and equal to zero. The isotropy of thermo e.m.f. in germanium is substantiated. Measurements of the volume-gradient thermo e.m.f. of samples annealed at 500°C for 32 hours proved that the effect is indifferent to annealing. This proves that not the lattice defects but the heterogeneities in the distribution of residual impurities in germanium are responsible for the generation of the volume-gradient thermo e.m.f. ℓ_{α}. It was shown that ℓ_{α} disappears in the temperature range of intrinsic conduction also in annealed samples. The heat conductivity in germanium is also isotropic, as was shown with an accuracy of $1 \div 2\%$. The heat conductivity versus temperature function was measured in the temperature interval of $77 \leq T \leq 370°K$. The free length of path of the phonons was estimated according

Investigation of the Volume-Gradient Thermo-e.m.f. and of the Heat Conductivity in Germanium Monocrystals With Definite Crystallographic Orientation SOV/57-58-8-1/37

to the accurate value of the heat conductivity of Ge at room temperature. It amounted to $2.8 \cdot 10^{-6}$ which equals about 50 lattice parameters of Ge. The germanium crystals were made available by E.B.Mertens (deceased) and A.N.Kvasnitskaya. There are 3 figures, 4 tables, and 8 references, 5 of which are Soviet.

ASSOCIATION: Institut fiziki AN USSR, Kiyev (Kiyev Physics Institute, AS Ukr SSR)

SUBMITTED July 22, 1957

Card 3/3

BARANSKIY, P. I.

57-2-1/32

AUTHOR: Baranskiy, P. I.

TITLE: Volume Peltier-Effect in Germanium (Ob"yemnyy effekt Pel'tye v germanii).

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol. 28, Nr 2, pp. 225-230 (USSR).

ABSTRACT: A method for the determination of the volume Peltier effect developing at the heterogeneities of the specific resistances is here tested in experiments with germanium monocrystals and suggested. It is pointed out that this method can be employed for the investigation of the Peltier-effect developing in an isotropic media at crystallographic "heterogeneities". The existence of the volume Peltier effect $\mathcal{E}_p$ developing at the heterogeneities of the specific resistance in the germanium monocrystals is here proved by way of experiment. By means of "reversal" of the tests the development of a thermo-electromotive force $\mathcal{E}_a$ with a volume gradient in the presence of a temperature gradient and a heterogeneity of the specific resistance in the germanium-volume is confirmed. The linearity of the current characteristics $\mathcal{E}_p = \mathcal{E}_p(i)$ is shown and the analysis of the causes leading to a deviation from the linearity in the integral-values of the thermo-electromotive force with a volume gradient $\mathcal{E}_a = \mathcal{E}_a(\Delta T)$ (within the do-

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Volume Peltier- Effect in Germanium. 57-2-1/32

main of the method applied) are given. The author takes into account the fact that the semiconductor-materials as a rule are heterogeneous and the analysis of those errors which appear every individual concrete case be brought in by the effects described here in the investigations of the volume-properties of the semiconductor-bodies is considered extremely important by him. The work was discussed with K. B. Tolpygo. The mechanic V. N. Litvin helped in constructing the measuring devices.
There are 6 figures, and 9 Slavic references.

ASSOCIATION: Institut of Physics AS Ukrainian SSR, Kiyev (Institut fiziki AS USSR, Kiyev).

SUBMITTED: August 31, 1957.

AVAILABLE: Library of Congress.

1. Single crystals-Properties 2. Germanium crystals-Analysis

Card 2/2

AUTHOR: Baranskiy, P. I. 57-28-4-3/39

TITLE: Mobility of the Minority Current-Carriers in Collinear Electric and Thermal Fields (Podvizhnost' neosnovnykh nositeley toka v kollinearnykh elektricheskikh i teplovykh polyakh)

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol. 28, Nr 4, pp. 694-703 (USSR)

ABSTRACT: The author investigated the mobility of the drift of minority current-carriers injected by means of a point-contact in germanium of the p-type in the range of room-temperatures. The zero measurement method was employed for this purpose. The following was found: 1.) Under maintenance of the constant average temperature Θ of the sample in the interval of the modification of the temperature gradient in the range of $0 \leqslant \frac{dT}{dx} \leqslant 31^{\circ}C$ the μ-value does not depend on the latter. 2.) This fact proves the absence of a marked electron-phonon drag (Gurevich-effect) at room temperature. This fact apparently excludes the possibility of giving an explanation based on the drag-effect, and that $P \neq \alpha T$ in the range of conductivity caused by impurities. 3.) The negative answer to the question

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of the electron-phonon-interaction also extends the domain of employment of the zero method of μ (published earlier in Ref.6) to the case where a temperature gradient exists in the germanium-sample, in case that the measurements are performed at room temperature. Professor M. Shtenbek called the author's attention to this problem and V.N. Rudenko, laboratory assistant, helped with the performance of the experiments. There are 11 figures and 9 references, 4 of which are Soviet.

ASSOCIATION: Institut fiziki AN USSR, Kiyev (Institute for Physics AN Ukrainian SSR, Kiyev)

SUBMITTED: June 17, 1957

BARANSKIY, P.I.; KONOPLYASOVA, N.S.

Volume-gradient thermoelectromotive force and heat conductivity of germanium single crystals with definite crystallographic orientation. Zhur. tekh. fiz. 28 no. 8:1621-1630 Ag '58. (MIRA 11:10)

1. Institut fiziki AN USSR, Kiyev.
(Germanium crystals--Thermal properties)

AUTHORS: Baranskiy, P. I., Komukhayev, E. I. SOV/57-28-9-5/33

TITLE: Volume-Gradient e.m.f. in Germanium When a Current is Flowing (Ob"yemno-gradiyentnaya eds pri nalichii toka v germanii)

PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1958, Vol 28, Nr 9, pp. 1896 - 1904 (USSR)

ABSTRACT: This is an examination of the influence of heterogeneities in germanium samples upon measurements by means of probes. In these measurements the usual compensation circuit and a probe equipment was used which permits to move the probes along the OX-axis, maintaining a constant distance between them. When using the probe method a few particular features of the pressing brush contacts (which were analyzed in references 2 and 3) were taken account of. In this work the generation of the volume gradient e.m.f. $\mathcal{E}^*_p$ is corroborated in samples of n- and p-germanium. This e.m.f. is generated at the passage of a d.c. and is caused by the existence of the gradient of ϱ. A correlation of the variations of $\mathcal{E}^*_p$ and ϱ with the coordinate x was found: it is shown that the zeros of $\mathcal{E}^*_p$ are within the range of the extremum values of

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$\frac{dQ}{dx}$, whereas the maxima of $\mathcal{E}_p^*$ are within the range of the maximum values of Q. The volume gradient e.m.f. about the heterogeneities of $\mathcal{E}_p^*$ in n- and p-germanium exhibits a different sign. In a series of special experiments samples were investigated for information bearing on the"volume extent"(ob"yemnost') of the investigated effect. In these experiments the surface treatment of the samples was varied, the samples were broken up into parts, and rotated about different axes. Thus the "volume extent" of the investigated effect and its indifference with respect to the surface state was substantiated. When probe measurements are made with high accuracy, it appears that probe methods are not entirely free from errors, if the volume-gradient e.m.f. $\mathcal{E}_p^*$ is ignored, as it is a contactless method. This is due to the fact that even under the most favorable conditions the semiconductor crystals under investigation are far from being homogeneous. This paper was discussed by V.Ye.Lashkarev, Member, Academy of Sciences, UkrSSR and the Superior Scientific Collaborator

Volume-Gradient e.m.f. in Germanium When a Current is Flowing SOV/57-28-9-5/33

K.B.Tolpygo. There are 13 figures, 2 tables, and 3 references, 3 of which are Soviet.

ASSOCIATION: Institut fiziki AN USSR, Kiyev (Institute of Physics AS UkrSSR, Kiyev)

SUBMITTED: September 2, 1957

Card 3/3

BARANSKIY, P.I. [Barans'kyi, P.I.]

Noncalorimetric method of measuring the relative values of the Peltier coefficient at the boundary between a metal and other metals or semiconductors. Ukr.fiz.zhur. 4 no.4:472-478 Jl-Ag '59. (MIRA 13:4)

1. Institut fiziki AN USSR.
(Thermoelectricity) (Semiconductors)

S/181/60/002/03/12/028
B006/B017

AUTHOR: Baranskiy, P. I.

TITLE: Volume-gradient Thomson Effect

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 3, pp. 445-457

TEXT: The phenomena occurring in the volume of a single crystal due to non-homogeneities of resistivity have repeatedly been experimentally investigated (V. Ye. Lashkarev, V. A. Romanov, Ya. Tauc, Z. Trousil, and G. Frank). In the present paper, the author gives an analysis of the thermogalvanic phenomena occurring in a charged non-homogeneous semiconductor. He also demonstrates that under these conditions a volume-gradient Thomson effect is bound to occur, which is connected with the non-homogeneous resistivity in the volume of the semiconductor single crystal. The occurrence of the temperature gradient in the interior of the sample on the passage of current through non-homogeneous germanium single crystals was experimentally confirmed. An investigation of the current dependence of these gradients shows that $|\text{grad } T| \sim I^2$. The spatial distribution of these gradients has also been investigated with constant

current, and it was found that the sign of grad T was determined by the sign of grad ρ. Non-homogeneities of ρ lead to inner temperature gradients which, in turn, bring about the occurrence of a volume-gradient Thomson effect on the passage of current. The author suggests a method for measuring the volume-gradient Thomson effect (which has also been experimentally verified). This method also permits an exact measurement of the volume Peltier effect. The Thomson effect was exactly proved by experiment, and its current dependence was investigated. In this connection it was found that the volume-gradient Thomson effect of the third power was proportional to the amperage ($Q_{v-g} = \tau \frac{dT}{dx} I$ = const I^3).

In conclusion, the author thanks V. Ye. Lashkarev, Academician of the AS UkrSSR, K. B. Tolpygo, senior research worker, for discussions, and Diploma student P. M. Kurilo of Kiyevskiy gosudarstvennyy universitet (Kiyev State University) for carrying out control experiments. There are 15 figures and 7 references: 5 Soviet and 2 Czech.

/B

Volume-gradient Thomson Effect

S/181/60/002/03/12/028
B006/B017

ASSOCIATION: Institut fiziki AN USSR Kiyev (Physics Institute of the AS UkrSSR, Kiyev)

SUBMITTED: June 15, 1959

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S/181/60/002/03/13/028
B006/B017

AUTHORS: Baranskiy, P. I., Kurilo, P. M.

TITLE: Dependence of the Volume Peltier Effect on the Gradient of Specific Resistance

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 3, pp. 458-462

TEXT: In a previous paper, the existence of a volume Peltier effect $\mathcal{E}_p$ on n-type and p-type germanium single crystals with non-homogeneous specific resistance ρ has been experimentally proved, and it was found that $\mathcal{E}_p$ is directly proportional to the amperage. In the present paper, the function $\mathcal{E}_p = f(d\rho/dx)$ is investigated for a non-homogeneous ρ by using a method developed in Ref. 2. The measurements were made with seven sample pairs of n-type germanium in the range $0 \leq I \leq 90$ ma. The results of these measurements are shown in Fig. 1 ($\mathcal{E}_p = f(I)$). The following diagrams (Fig. 2) show $\log \mathcal{E} = f(\log I)$ - straight line - and Fig. 3 shows the distribution function $\rho(x)$ along the sample. Fig. 4 shows

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Dependence of the Volume Peltier Effect on the Gradient of Specific Resistance

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B006/B017

$\mathcal{E}_p$ as a function of $\frac{1}{\rho}\frac{d\rho}{dx}$; the measured values lie almost on a straight line. Hence, the function $\mathcal{E}_p|_{I=const} = const\ \frac{1}{\rho}\frac{d\rho}{dx}$ may be regarded as experimentally verified. The data of numerical measurement are compiled in a Table. The authors thank V. Ye. Lashkarev, Academician of the AS UkrSSR, for his interest and discussions, and A. N. Kvasnitskaya for supplying the samples. There are 4 figures, 1 table, and 2 Soviet references.

ASSOCIATION: Institut fiziki AN USSR Kiyev (Physics Institute of the AS UkrSSR, Kiyev)

SUBMITTED: June 15, 1959

VC

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81358

S/181/60/002/03/14/028
B006/B017

24.7700

AUTHOR: Baranskiy, P. I.

TITLE: The Nature of the Volume-gradient emf Occurring in Germanium in the Presence of a Current

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 3, pp. 463-464

TEXT: In continuation of a previous paper (Ref. 1) in which the occurrence of a volume-gradient emf $\mathcal{E}^*_p$ in germanium single crystals in the presence of a current was proved and the correlation between $\mathcal{E}^*_p$ and grad ρ (homogeneous case) was investigated, the author wanted to investigate the nature of $\mathcal{E}^*_p$. The current dependence of $\mathcal{E}^*_p$ was investigated in many relatively highly resistive n-type Ge samples (resistivity ρ between 2-3 and 12 ohm.cm), and the empirical relation $\mathcal{E}^*_p = A(e^{\alpha I} - 1)$ was found, where A and α are constants. This formula reproduces the experimental data satisfactorily if $\mathcal{E}^*_p$ is changed by 10 - 40 times. Since in germanium with $\bar{\rho} \simeq 5$ - 10 ohm.cm at room temperature a considerable quantity of minority carriers is present,

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The Nature of the Volume-gradient emf Occurring in Germanium in the Presence of a Current

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the occurrence of the emf $\mathcal{E}_p^*$ is brought into connection with an injection of minority carriers from one part of the non-homogeneous sample into another. This assumption is supported by V. Ye. Lashkarev's theoretical and experimental investigations of the specific characteristics of bipolar carrier diffusion. These investigations showed that, if no volume charges are formed, the diffusion lengths of the minority carriers can be considerable, and that they may vary in a wide range. To verify this hypothesis, some independent experiments were made. Hence, the dependence of $\mathcal{E}_p^*$ on the minority carrier lifetime was investigated, and it was found that all factors leading to a decrease in τ_{eff} also reduce $\mathcal{E}_p^*$. An investigation of the temperature dependence of $\mathcal{E}_p^*$ showed that it first increases and then decreases near the range of natural conductivity. All results lead to the conclusion that the occurrence of a volume-gradient emf $\mathcal{E}_p^*$ on the passage of current through germanium (and if grad $\rho \neq 0$) is caused by distributed injection of minority carriers. K. B. Tolpygo is also mentioned in this paper. There are 5 Soviet references.

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81358

The Nature of the Volume-gradient emf Occurring in Germanium in the Presence of a Current

S/181/60/002/03/14/028
B006/B017

ASSOCIATION: Institut fiziki AN USSR Kiyev (Physics Institute of the AS UkrSSR, Kiyev)

SUBMITTED: June 29, 1959

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82986
S/181/60/002/008/005/045
B006/B070

24.7600

AUTHORS: Baranskiy, P. I., Tomkevich, S. L.

TITLE: The Bridgman Effect in Bismuth Telluride Crystals

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 8, pp. 1714-1722

TEXT: In Ref. 11, Baranskiy has mentioned the appearance of a Peltier effect and a thermo-emf in polycrystalline Bi_2Te_3 on a transition of the passage of current from a direction parallel to the cleavage face to one perpendicular to it (∥-⊥). The authors investigated evolution and absorption of heat, and thermo-emf on passage of current in similar samples ($n_p = 10^{20} cm^{-3}$). For some samples the transition was (∥-⊥), and for others (⊥-∥). The following results were obtained: (1) In those samples of the polycrystalline p-type Bi_2Te_3 where the transition was (∥-⊥) there was an evolution or absorption of heat ℓ_p; ℓ_p is a linear function of the current J (ℓ_p = const J) and this so-called Bridgman effect is identical with Peltier effect for (∥-⊥ ; ⊥-∥) transitions. (2) On establishing a temperature gradient during (∥-⊥) transition,

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The Bridgman Effect in Bismuth Telluride Crystals

a thermo-emf $\alpha_{\parallel-\perp}$ corresponding to the above mentioned Bridgman effect appears, and there is a linear relationship between the integral values of this thermo-emf and the temperature gradients in the region concerned: $\mathcal{E}_{\parallel-\perp} = \alpha_{\parallel-\perp} \Delta T$. (3) It could be shown that the observed phenomena are not a consequence of the existence of a grad ρ in the volume of the investigated samples, and therefore, are not identical with either the volume Peltier effect or volume gradient thermo-emf. Fig. 1 shows the experimental arrangement for the measurement of a T shaped sample during the passage of the current; Fig. 2 shows $\mathcal{E}_p(J)$ at 22°C. The origin of the observed non-linearity for $J > 250$ma is ascribed to a Joule heating of the sample. The measured T(J) curve is shown in Fig. 3. Figs. 4 and 5 show the resistivity distribution along the length ($x = 24.6$ mm) of the sample, $\rho(x)$. Other diagrams show analogous curves for other samples taken under other conditions. According to the authors' suggestion the observed phenomena appear in the volume of the crystallite due to effects occurring on the discontinuities of the crystallographic orientation, as well as in the spacings between them on account of the free surface effects. The surfaces form acute angles with the directions of the

principal crystallographic axes. The possibility that the two effects occur simultaneously is also discussed. The authors thank Academician A. F. Ioffe for support from the funds of Institut poluprovodnikov AN SSSR (Institute of Semiconductors of the AS USSR), the Academician of the AS UkrSSR V. Ye. Lashkarev for interest and advice, and G. Ye. Pikus for the evaluation of the previous results. There are 10 figures and 12 references: 5 Soviet, 4 US, and 3 German.

ASSOCIATION: Institut fiziki AN USSR Kiyev (Institute of Physics of the AS UkrSSR)

SUBMITTED: November 30, 1959

X

20795

S/181/61/003/003/021/030
B102/B205

9.4300 (1143, 1150, 1151, 1161)

AUTHORS: Baranskiy, P. I., Dzyubenko, G. M., and Konoplyasova, N. S

TITLE: Experimental study of the nature of the volume-gradient emf occurring in germanium in the presence of a current

PERIODICAL: Fizika tverdogo tela, v. 3, no. 3, 1961, 876-883

TEXT: In an earlier paper (Ref. 1: ZhTF, XXVIII, 1896, 1958), Baranskiy et al. reported on the detection of a volume-gradient emf, $\mathcal{E}_p^*$, which occurs at the resistivity gradients ($\nabla\varrho$) in single crystal crystals of n-type and p-type germanium during the passage of a current. Consideration of the specific peculiarities of bipolar carrier diffusion (theoretically and experimentally studied by V. Ye. Lashkarev) indicates that $\mathcal{E}_p^*$ is probably due to the injection of minority carriers from one part of an inhomogeneous specimen into another. This assumption was checked by a measurement of the resistivity, ϱ, by a probe compensation method. The authors proceeded from the following: If $\mathcal{E}_p^*$ is due to the factors assumed, the potential drop between the measuring drops can only increase if the direction of $\nabla\varrho$

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Experimental study ...

(between the probes) coincides with the direction of $\vec{E}$ on the specimen; in the opposite case, the potential drop decreases. This could be proved experimentally. A study of the dependence of $\mathcal{E}_p^*$ on the geometry of the specimen has shown that $\mathcal{E}_p^*$ decreases simultaneously with a reduction of the surface area S. This is due to surface recombination. A great influence is exerted by the treatment, i.e., the condition of this area on $\mathcal{E}_p^*$. This was proved by investigations of n-type Ge specimens, whose surfaces had been treated with abrasives of different hardness. It was found that coarse-grained abrasives lower τ_{eff}, which results in a considerable decrease in $\mathcal{E}_p^*$. Among other things, the authors studied the temperature dependence of $\mathcal{E}_p^*$, ϱ, and p/n (concentration ratio of holes to electrons) in order to obtain additional evidence for the correctness of the injection theory. Fig. 6 shows $\mathcal{E}_p^*$, ϱ, and p/n as a function of temperature for I = const. The rapid increase of $\mathcal{E}_p^*$ in the range of $290 \leq T \leq 335^{\circ}K$ corresponds to a rapid increase of the minority carriers (cf. p/n curve).

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Experimental study ...

The rapid decrease of $\mathcal{E}_p^*$ after the maximum is related to a homogenization of the specimen, caused by an increase in the intrinsic carrier concentration (p/n approaches unity). In the region of growth, the function $\mathcal{E}_p^*(T)$ corresponds to $p/n = f(T)$, which is in accordance with the results obtained by Z. A. Demidenko and K. B. Tolpygo. The current dependence of $\mathcal{E}_p^*$ under strictly isothermal conditions has also been studied. The empirical relation $\mathcal{E}_p^* = A(e^{\alpha I} - 1)$ has been found already earlier. An exponential function with an exponent 2 in the first part and an exponent < 2 at higher amperages was obtained for $\mathcal{E}_p^*(I)$ by exact measurements (cf. Fig. 10). Results: 1) All the factors reducing the effective carrier lifetime τ_{eff} also reduce $\mathcal{E}_p^*$. 2) A correlation exists between the temperature dependence of $\mathcal{E}_p^*$ and that of p/n. Both $\mathcal{E}_p^*$ and n_i^2 are proportional to $\exp(-\Delta\epsilon/kT)$ (n_i - intrinsic carrier concentration, $\Delta\epsilon$ - forbidden band width). 3) The "floating particles" are not responsible for the occurrence of $\mathcal{E}_p^*$ in Ge. 4) $\mathcal{E}_p^*(I)$ is an exponential function. 5) The experimental

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Experimental study ...

data indicate that $\mathcal{E}_p^*$ is caused by distributed injection (exclusion) of minority carriers. V. Ye. Lashkarev, Academician AS UkrSSR, is thanked for discussions. There are 10 figures and 8 references: 6 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: Institut fiziki AN USSR Kiyev (Institute of Physics, AS UkrSSR, Kiyev)

SUBMITTED: July 26, 1960

Experimental study ...

Fig. 6

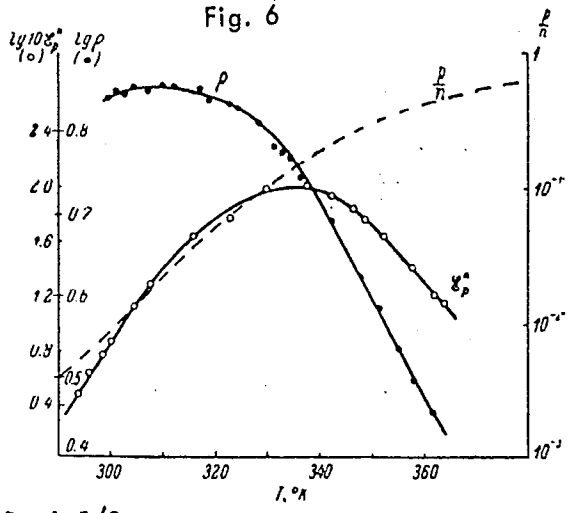

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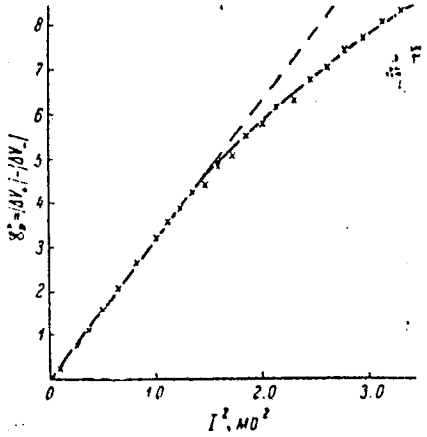
Fig 10



BARANSKIY, P.I.

Volume-gradient phenomena and the feasibility of the second thermoelectric relation. Fiz.tver.tela 3 no.5:1616-1617 My '61. (MIRA 14:6)

1. Institut poluprovodnikov AN USSR, Kiyev.
(Thermoelectricity)

24920 S/181/61/003/006/017/031
B102/B201

9.4300

AUTHOR: Baranskiy, P. I.

TITLE: Concentration dependence of thermo-emf in n- and p-type germanium

PERIODICAL: Fizika tverdogo tela, v. 3, no. 6, 1961, 1786 - 1789

TEXT: The theoretically obtained differential thermo-emf α as a function of the carrier concentration n is compared here with experimental results, and a possible way of improving the agreement is pointed out. Function $\alpha(n)$ for a nondegenerate atomic semiconductor is theoretically given by

Pisarenko's formula: $\alpha = \frac{k}{e}\left[A + \ln \frac{2(2\pi m^* kT)^{3/2}}{nh^3}\right]$. A is a constant, equal to 2 or 4, depending on whether the carriers are scattered by lattice vibrations or by ionized impurities. A study of galvanomagnetic effects has shown that the contribution of the scattering by impurities (for $T \simeq 300^{\circ}K$)

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increases with growing n, and that it is considerable already in the range $n \sim 10^{17} - 10^{19} cm^{-3}$, so as to influence the kinetic effects in the semiconductor. If, as is done in Pisarenko's formula, only scattering by lattice vibrations or by impurity centers is considered, a straight line will be still obtained for the $\alpha(n)$ function, represented as $\alpha = f(\ln n)$, (as is also obtained experimentally in a certain range of carrier concentrations), but the inclination of this straight line differs from that of the experimental line. It is shown that the agreement between theory and experiment can be considerably improved by taking into account the carrier scattering by lattice vibrations and ionized impurities simultaneously. The influence of scattering by impurities upon the kinetic effects is taken into account according to A. I. Ansel'm and V. I. Klyachkin (ZhETF, 22, 297, 1952):

$$\alpha = \frac{k}{e}\left\{\varphi(\gamma) + \ln\frac{2(2\pi m^* kT)^{3/2}}{nh^3}\right\}, \qquad \mathrm{Si}\,\gamma = \int_{\gamma}^{\infty}\frac{\sin t}{t}\,dt,\ \mathrm{Ci}\,\gamma = \int_{\infty}^{\gamma}\frac{\cos t}{t}\,dt,$$

$$\varphi(\gamma) = \frac{2 - \gamma^2 + \gamma^3(\sin\gamma\,\mathrm{Ci}\,\gamma + \cos\gamma\,\mathrm{Si}\,\gamma)}{1 + \gamma^2(\cos\gamma\,\mathrm{Ci}\,\gamma - \sin\gamma\,\mathrm{Si}\,\gamma)}, \qquad \gamma = \sqrt{6\beta} = \sqrt{6\frac{\rho_I}{\rho_L}},$$

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As may be seen, the constant A is here replaced by the function $\varphi(\gamma)$. The $\alpha(\ln n_e)$ and $\alpha(\ln n_p)$ curves obtained experimentally for n- and p-type Ge single crystals are compared with those obtained by Pisarenko's formula and by Ansel'm's formula. The curve obtained by the former formula is found to be much too steep. Measurements at room temperature of the $\alpha(\ln n_{e,p})$ curves in the $10^{14} \leq n_{e,p} \leq 10^{18}$ cm^{-3} interval have shown these curves to be straight lines with an inclination of $\approx 72 \mu v/deg$, which differs from the inclination resulting from Pisarenko's formula ($k/e \approx 86 \mu v/deg$) considerably. A good agreement between experiment and theory of thermo-emf is found, however, in the $8 \cdot 10^{14} - 4 \cdot 10^{17}$ cm^{-3} concentration range, if scattering by lattice vibrations and by impurity centers is taken into account. V. Ye. Lashkarev, Academician of AS UkrSSR, and E. I. Rashba and I. I. Boyko, co-workers of the Institute of Semiconductors AS UkrSSR are thanked for their interest and discussions, and laboratory assistant L. I. Korneychuk is thanked for his assistance. There are 4 figures and 10 references: 7 Soviet-bloc and 3 non-Soviet-bloc.

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Concentration dependence of... 24920 S/181/61/003/008/017/031
B102/B201

AUTHOR: Institut poluprovodnikov AN USSR, Kiyev (Institute of Semiconductors, AS UkrSSR, Kiyev)

SUBMITTED: December 15, 1960

Card 4/4

BARANSKIY, P.I.; DZYUBENKO, G.M.; KONOPLYASOVA, N.S.

Experimental study of the nature of the volume-gradient e.m.f. arising in germanium under the action of an electric current. Fiz. tver. tela 3 no. 3:876-883 Mr '61. (MIRA 14:5)

1. Institut fiziki AN USSR, Kiyev.
(Germanium--Electric properties)

BARANSKIY, P.I.

Volume-gradient phenomena and applicability limits for measuring the electric conductivity of semiconductors by the probe compensation method. Fiz. tver. tela 3 no. 3:884-888 Mr '61. (MIRA 14:5)

1. Institut fiziki AN USSR, Kiyev.
(Semiconductors--Electric properties)

BARANSKIY, P.I.

Concentration dependence of the thermo-emf in n- and p-germanium.
Fiz. tver. tela 3 no.6:1786-1789 Je '61. (MIRA 14:7)

1. Institut poluprovodnikov AN USSR, Kiyev.
(Thermoelectricity) (Germanium)

33368
S/181/62/004/001/046/052
B112/B138

24.7600 (1035, 1043, 1137)

AUTHORS: Baranskiy, P. I., and Vinetskiy, R. M.

TITLE: Dependence of the Hall coefficient of p-type germanium on magnetic field strength

PERIODICAL: Fizika tverdogo tela, v. 4, no. 1, 1962, 289 - 291

TEXT: The dependence of Hall coefficient R on magnetic field strength H was determined for two samples of p-type germanium (B_p-1 and B_p-2). In particular, the behavior of R was investigated in the range of low field strengths. The results are shown in the figure. H is given in oersteds, R in 10^4 cubic centimeters/coulomb, ρ of B_p-1 was 8.37 ohm·cm, ρ of B_p - 2, 8.82 ohm·cm. The measurements were carried out at room temperature. The experimental results are in good agreement with theory, the error being found to be systematic. There are 1 figure and 7 references: 1 Soviet and 6 non-Soviet. The four most recent references to English-language publications read as follows: W. C. Dunlap. Phys.

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Rev., 79, 286, 1950; W. C. Dunlap. Phys. Rev., 82, 529, 1951; T. C. Harman, R. K. Willardson a. A. C. Beer. Phys. Rev., 94, 1065, 1954; R. K. Willardson, T. C. Harman, A. C. Beer. Phys. Rev., 96 1512, 1954.

ASSOCIATION: Institut poluprovodnikov AN USSR Kiyev (Institute of Semiconductors AS USSR Kiyev)

SUBMITTED: September 11, 1961

Card 2/2

BARANSKIY, P.I. [Barans'kyi, P.I.]; KURILO, P.M. [Kurylo, P.M.]

Concentration dependence of the Hall factor in n-germanium.
Ukr. fiz. zhur. 8 no.10:1176-1179 O '63. (MIRA 17:1)

1. Institut poluprovodnikov AN UkrSSR, Kiyev.

ACCESSION NR: AP4011736 S/0181/64/006/001/0054/0057

AUTHORS: Baranskiy, P. I.; Kurilo, P. M.

TITLE: Investigating the symmetry properties of isoenergy surfaces in n type germanium by means of Hall measurements

SOURCE: Fizika tverdogo tela, v. 6, no. 1, 1964, 54-57

TOPIC TAGS: Hall coefficient, semiconductor, germanium, isoenergy surface, energy structure

ABSTRACT: Because the anisotropy and dependence of the Hall coefficient on the magnetic field are determined both by the structure of isoenergy surfaces and by the mechanism of scattering, it is necessary to study the anisotropy of the Hall coefficient at various crystal orientations in the magnetic field. Measurements were made on n-type germanium with a resistivity of about 10.3 ohm cm. They were made at room temperature in the interval $8 \cdot 10^5 \leqslant H \leqslant 2 \cdot 10^7$ ampere-turns per meter on samples oriented with the crystallographic axes symmetrical with the magnetic field and on samples not symmetrically oriented. The unsymmetrical orientation

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ACCESSION NR: AP4011736

permitted the authors to establish a correlation between the results they obtained and the structure of the isoenergy surfaces, which are widely recognized from experiments on cyclotron resonance. On the basis of these experiments, the authors suggest the possible use of this method for obtaining information on the energy structure in semiconductors for which this structure is not yet known. "The authors express their thanks to Ye. G. Miselyuk and V. M. Buymistrov for their interest in the work and for useful discussions, and also to A. S. Rodionov and V. A. Savitskiy for their aid in preparing and conducting the described experiments." Orig. art. has: 4 figures.

ASSOCIATION: Institut poluprovodnikov AN USSR, Kiyev (Institute of Semiconductors AN UkrSSR)

SUBMITTED: 28Jun63 DATE ACQ: 14Feb64 ENCL: 00

SUB CODE: EC, SS NO REF SOV: 000 OTHER: 004

Card 2/2

ACCESSION NR: AP4026428 S/0181/64/006/004/1048/1050

AUTHORS: Baranskiy, P. I.; Vinetskiy, R. M.; Kurilo, P. M.

TITLE: Anisotropy of the Hall coefficient in p-type germanium

SOURCE: Fizika tverdogo tela, v. 6, no. 4, 1964, 1048-1050

TOPIC TAGS: germanium, semiconductor, Hall coefficient, hole interaction, impurity concentration, impurity scattering, lattice scattering

ABSTRACT: Resistivity of the samples ranged from 0.13 to 37 ohm cm. Measurements were made at room temperature and at 77K. It was found that the degree of anisotropy $R(H)/R_0$ decreases with fall in temperature and with increase in impurity concentration. It proved always to be greater, other conditions being the same, when the magnetic field was directed along [001] than when directed along [110], the electrical field being along [110] in both cases. The difference between the minimum values of $R(H)/R_0$ for these two orientations decreases in resistivity and in temperature. The authors conclude that this is due to different degrees of anisotropy in impurity and lattice scattering, and also to increasing effec-

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ACCESSION NR: AP4028428

tiveness of interaction between holes as the concentration of holes increases. Orig. art. has: 2 figures.

ASSOCIATION: Institut poluprovodnikov AN UkrSSR, Kiev (Institute of Semiconductors AN UkrSSR)

SUBMITTED: 08Oct63 DATE ACQ: 27Apr64 ENCL: 00

SUB CODE: EC, SS NO REF SOV: 000 OTHER: 006

Card 2/2

ACCESSION NR: AP4041730 S/0181/64/006/007/2183/2187

AUTHORS: Baranskiy, P. I.; Krutelev, Ye. S.

TITLE: Effect of impurity scattering on the anisotropy of the planar Hall effect in n-germanium

SOURCE: Fizika tverdogo tela, v. 6, no. 7, 1964, 2183-2187

TOPIC TAGS: Hall effect, germanium, anisotropy, relaxation time, impurity center, Hall constant, Hall conductivity

ABSTRACT: This research was undertaken because of the presence of data indicating that the anisotropy of the relaxation time can be appreciable, and because of the lack of published data on the effect of impurity scattering on the anisotropy of the planar Hall effect. Specimens with axes aligned with those equivalent to [100] (specimens 0) and with the x, y, z axes parallel to [110], [110], and [001], respectively (specimens A) were used. The planar Hall effect was mea-

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ACCESSION NR: AP4041730

sured for all specimens at a magnetic field H = 2.168 x 10^6 A/m and at I = 2.5 mA, and was shown to agree with other experimental results and with the theory (C. Goldberg and R. E. Davis, Phys. Rev. v. 94, 1121, 1954). The variation of the planar Hall effect coefficient with the resistivity (i.e., with the contribution of impurity scattering) was found to be highly anisotropic, as manifest by the results obtained for the different types of specimens. Data were also obtained for the Seitz coefficients, and the symmetry relations that follow from the theory of this effect for the magnetic resistivity coefficients were checked. Orig. art. has: 2 figures and 2 tables.

ASSOCIATION: Institut poluprovodnikov AN UkrSSR, Kiev (Institute of Semiconductors, AN UkrSSR)

SUBMITTED: 03Feb64 ENCL: 02

SUB CODE: SS NR REF SOV: 005 OTHER: 007

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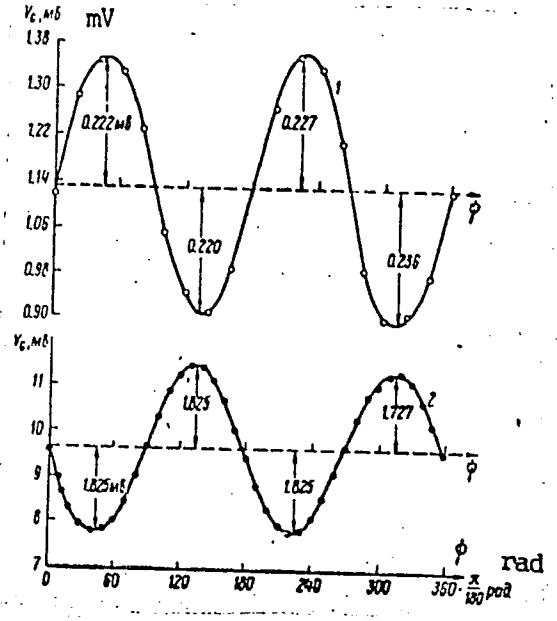
ACCESSION NR: AP4041730

ENCLOSURE: 01

Examples of angular dependences of planar Hall effect for samples having different crystallographic orientations and specific resistivities

1 - sample A (ρ_0 = 5.54 ohm-cm)

2 - sample O (ρ_0 = 35 ohm-cm)



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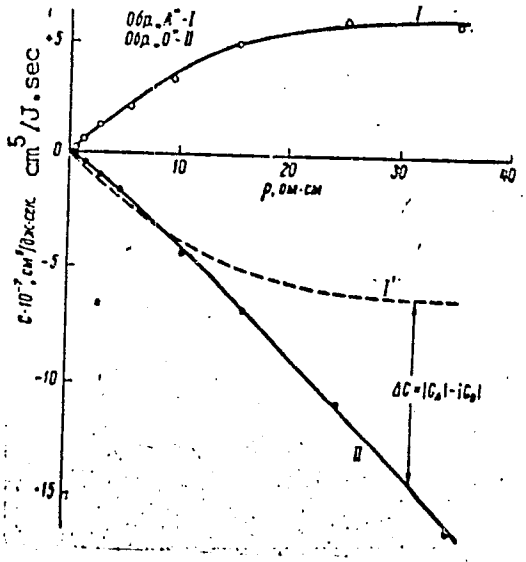
ACCESSION NR: AP4041730

ENCLOSURE: 02

Dependence of Hall-effect coefficient G on the specific resistivity ρ_0 (at room temperature)

I - sample A
II - sample 0



Card 4/4

BARANSKIY, P.I.; DAKHOVSKIY, I.V.; KURILO, P.M.

Anisotropy of the Hall coefficient for n-Si in the region of intermediate magnetic fields. Fiz. tver. tela 6 no.7:2204-2207 Jl '64.
(MIRA 17:10)

1. Institut poluprovodnikov AN UkrSSR, Kiyev.

L 11264-65 EWT(m)/EWP(t)/EWP(b) IJP(c)/AS(mp)-2/SSD/AFWL/ESD(gs)/ESD(t) JD

ACCESSION NR: AP4046625 S/0181/64/006/010/3089/3091

AUTHORS: Baranskiy, P. I.; Dakhovskiy, I. V.; Kurilo, P. M. B

TITLE: Concentration dependence of the anisotropy of the Hall coefficient in n-germanium 27

SOURCE: Fizika tverdogo tela, v. 6, no. 10, 1964, 3089-3091

TOPIC TAGS: Hall coefficient, anisotropy, impurity concentration, germanium

ABSTRACT: The anisotropy of the Hall coefficient was investigated in n-germanium samples having two different crystallographic orientations, at room temperature and at magnetic fields $8 \times 10^5 \leq H \leq 2 \times 10^7$ A/m. In addition, in order to be able to control the impurity scattering in a more direct fashion (by changing the concentration of the scattering centers rather than the temperature), the dependence of the anisotropy of the Hall coefficient on the concentration was investigated in the concentration range $6.8 \times 10^{13} \leq$

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$\leq n_e \leq 2.1 \times 10^{18}$ cm^{-3} under the same conditions. The two crystallographic orientations were H‖ [001], I‖ [110] and H‖ [110], I‖ [110]. Each pair of samples with two different orientations was made from a separate ingot, the ingots differing by the impurity concentration. The investigation procedure was essentially the same as used by two of the authors earlier (Baranskiy and Kurilo, FTT v. 6, 54, 1964). An analysis of the results shows them to be in good agreement with the theory of anisotropic scattering, developed in detail by A. G. Samoylovich, E. Ya. Korenblit, I. V. Dakhovskiy, and V. D. Iskra (FTT v. 3, 2939 and 3285, 1961; v. 4, 168, 1962; v. 6, 2032, 1964), and therefore can serve as an additional (and independent) experimental verification of this theory. "The authors are deeply grateful to Professor A. G. Samoylovich and Doctor of Physical-Mathematical Sciences Ye. G. Miselyuk for a detailed and very valuable discussion of the results." Orig. art. has: 3 formulas and 1 figure.

L 11264-65
ACCESSION NR: AP4046625

ASSOCIATION: Institut poluprovodnikov AN UkrSSR, Kiev (Institute of Semiconductors, AN UkrSSR)

SUBMITTED: 11May64 ENCL: 00

SUB CODE: SS NR REF SOV: 005 OTHER: 004

Card 3/3

L 11083-65 EWT(1)/EWT(m)/EEC(t)/EWP(t)/EWP(b) IJP(c)/AFWL/AS(mp)-2/ESD(t)
JD
ACCESSION NR: AP4046633 S/0181/64/006/010/3137/3140

AUTHORS: Baranskiy, P. I.; Baydakov, V. V.; Kurilo, P. M.

TITLE: Anisotropy of the Hall coefficient of n-type germanium in the mixed scattering region (B)

SOURCE: Fizika tverdogo tela, v. 6, no. 10, 1964, 3137-3140

TOPIC TAGS: Hall coefficient, anisotropy, carrier scattering, lattice scattering, impurity scattering, germanium semiconductor

ABSTRACT: The anisotropy of the Hall coefficient in the region of mixed scattering (lattice and impurity) was investigated in n-type germanium prepared from a homogeneous ingot with resistivity approximately 0.5 ohm-cm. The angular dependence of the quantity $\Delta R/R(0)$ (R -- Hall coefficient) was measured as a function of the magnetic field direction in a plane perpendicular to the current direction in three series of samples. In the samples of each of these series

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